

the night on which the liqueur glasses were thus charged with boiled milk, the author received from Dr. Roberts, of Manchester, a copy of his paper describing how he had got over all the difficulties, as regards milk, by a different and very simple method.* But beautiful as Dr. Roberts's method was, and perfectly conclusive against the theory of spontaneous evolution, it would not have answered the author's purpose, as it was essential for his investigations that the liquid should be decanted from the flask into the liqueur-glasses. The decanting was effected by means of a "heated" syphon, with special precautions against the entrance of living organisms, as was fully explained to the Society.

The same plan of "heating" the vessels and decanting was afterwards followed with turnip infusion and with urine; and in proof of the security of the method, flasks containing the residual stock of these fluids after decanting into twelve glasses from each nearly six weeks before, were shown to the Society quite unchanged. And as further evidence of the trustworthiness of the system pursued, it was mentioned that out of six series of wine-glasses with about twelve in each series, containing albuminous fluid, urine (in two series), Pasteur's solution, boiled milk and turnip infusion, although portions of the contents had been often removed for investigation or inoculation, only two instances were known to have occurred in which any organism (a filamentous fungus) had made its appearance which had not been arranged for either by inoculation or prolonged exposure.

(To be continued.)

SCIENTIFIC SERIALS

Ocean Highways for July is a very interesting number. The first article, on the "Voyage of the *Polaris*," accompanied by six small maps, shows that notwithstanding the disastrous results of Captain Hall's venture, it proves more strongly than ever that a well-equipped Arctic expedition, taking the route of Smith's Sound, would be attended with results of the highest value. "In the present day," the writer concludes, "when the true methods of exploring are well known, and men of science have clearly enumerated the important problems that will be solved, and the numerous valuable results that will be derived from the labours of an Arctic Expedition, the reasons for despatching one have acquired tenfold force." This is followed by a long and extremely valuable and interesting account of "Personal Experiences of Venomous Reptiles and Insects in South America," by Mr. Richard Spruce, who has spent fifteen years in Equatorial Africa for the purpose of investigating the natural history of that region. The author's account of his experiences gives a vivid idea of the many dangers and trials to which devotees of science are exposed, in their endeavours to add to the sum of human knowledge. We would strongly recommend Mr. Spruce's interesting article to all who take an interest in the subject, on which, our readers may remember, there was recently some correspondence in *NATURE*. H. H. Giglioli contributes two very valuable letters from Dr. Beccari on his explorations in Papuasia, which are likely to be attended with very important results. Other papers in this number are "On Settlements on the Gold Coast," with a map; a paper on Khiva, by Rev. G. P. Badger, consisting of a catena of extracts from several eminent Arabic writers; the "Foot-paths of London," a sort of popular geological lecture, by Mr. H. P. Malet; and the second part of Prof. H. Mohn's article on the Meteorological Institute of Norway.

Bulletin de la Société de Géographie, May. The first article in this journal is by M. Charles Maunoir, on the work of the French Geographical Society, and the Progress of the Geographical Sciences during the year 1872.—Mr. W. Huber contributes an interesting paper on the telegraphic network of the globe, with a map showing at a glance how much has already been done in this way to annihilate distance, and how much remains to be done to complete this important work.—This is followed by the conclusion of M. Balansa's paper on New Caledonia, the present instalment treating specially of the Loyalty Islands.—M. Edouard Sayons gives an abstract of the contents of M. Hunfalvy's very interesting work on the Finnish Provinces of the Baltic; the work is published in Hungarian, and is an account of the author's explorations in the districts mentioned in the year 1870.

* See *NATURE*, Feb. 26, 1873.

SOCIETIES AND ACADEMIES

Royal Society, June 19.—"On a newly discovered extinct Mammal from Patagonia (*Homalodotherium Cunninghami*)," by William Henry Flower, F.R.S., Hunterian Professor of Comparative Anatomy, and Conservator of the Museum of the Royal College of Surgeons.

The author describes the complete adult dentition of a new genus of Mammal, founded on remains discovered by Dr. Robert O. Cunningham in deposits of uncertain age, on the banks of the River Gallejos, South Patagonia. The animal appears to have possessed the complete typical number of teeth, i.e. twenty-two above and below, arranged in an unbroken series, and of nearly even height, and presenting a remarkable gradual transition in characters in both jaws, from the first incisor to the last molar. The molars more clearly resemble those of the genus *Rhinoceros* than any other known mammal; and, judging by the general characters of the teeth alone, the animal would appear to have been a very generalised type of Perissodactyle Ungulate, allied through *Hyracodon* (a North-American Miocene form) to *Rhinoceros*, also more remotely to *Macrauchenia*, and, though still more remotely, to the aberrant *Nesodon* and *Taxodon*. The generic name *Homalodotherium* was suggested for this form by Prof. Huxley in his Presidential Address to the Geological Society in 1870.

"The Diurnal Variations of the Wind and Barometric Pressure at Bombay," by F. Chambers. Communicated by Charles Chambers, F.R.S., Director of the Colaba Observatory, Bombay.

The object of this paper is to bring to notice a remarkable relation that has been found to exist between the diurnal variations of the wind and the barometer at Bombay.

The observations made use of are the records of a Robinson's anemograph during the first three years of its performance, viz. from June 1867 to May 1870, and the corresponding hourly observations of the barometer and the dry- and wet-bulb thermometer, made at the Government Observatory, Bombay.

The mean results for each hour of the day during the whole period, and the mean diurnal relations of each element are tabulated and graphically represented by figures. The diurnal variation of the wind is then investigated, the most influential part of which is attributed to the land- and sea-breezes which blow from E.S.E. and W.N.W., and are shown to follow mainly the same law of progression as the temperature of the air, thus affording confirmatory evidence of the truth of Hadley's theory of the trade-winds as applied to land- and sea-breezes.

Some peculiarities of the curve representing the land- and sea-breezes are then pointed out, and these the writer concludes are due to the superposition of another distinct variation having two maxima and two minima in the twenty-four hours like the barometer variation; and he supports his views by a reference to the variation of the east components of the wind in the months of July and August, when the land- and sea-breezes have almost disappeared. This is found to exhibit a decided double period. The north components of the land- and sea-breezes are then approximately eliminated from the north components of the whole variation, and the variation which then remains exhibits a very decided double period in this direction also. These variations with double periods are regarded as indicative of the existence of a double diurnal variation in the general movements of the atmosphere. Upon this hypothesis typical diurnal variations of the wind are deduced for north and south low latitudes; that for north latitudes exhibiting a double diurnal right-handed rotation, and that for south latitudes a double diurnal left-handed rotation, and from these the diurnal variation of the barometer is deduced.

The movements of the wind-vane at Bombay are then analysed, and the writer concludes that the greater part of the excess of "direct" over "retrograde" rotation of the vane at Bombay is due to the diurnal variation of the wind.

Extracts are given from observations made at St. Helena, Toronto, and Falmouth, showing the character of the diurnal wind-variations at those places, and their greater or less agreement with the deduced typical curves. The writer maintains that these variations afford independently a possible, if not a probable explanation of that movement of the air which Dove had called the "Law of Gyration;" and in conclusion he points to the extent of their applicability in deducing weather probabilities, and to the method of discussing storms.

A postscript is added, giving the mean diurnal variation of the wind at Sandwick Manse, Orkney, and pointing out its general conformity with the results deduced from the Bombay wind-observations.

"On the Mathematical Expression of Observations of Complex Periodical Phenomena, and on Planetary Influence on the Earth's Magnetism," by Charles Chambers, F.R.S. and F. Chambers.

"Observations of the Currents and Undercurrents of the Dardanelles and Bosphorus, made by Commander J. L. Wharton, of H.M. Surveying Ship *Shearwater*, between the months of June and October, 1872." From a Report of that Officer to the Hydrographer of the Admiralty. Communicated by Admiral Richards, C.B., V.P.R.S.

Geological Society, June 25.—Joseph Prestwich, F.R.S., vice-president, in the chair. The following communications were read:—"On six Lake-basins in Argyllshire," by his Grace the Duke of Argyll, F.R.S., president. The author referred to the part ascribed to glacial action in the formation of lake-basins, and described the basins of six lakes in Argyllshire, the characters presented by which seemed to him inconsistent with their having been excavated by ice. Among these lakes were Loch Fyne, Loch Awe, Loch Leckan, and the Dhu Loch.—"Description of the Skull of a dentigerous Bird (*Odontopteryx totiapicus*, Owen), from the London clay of Sheppey," by Prof. Richard Owen, F.R.S. The specimen described by the author consisted of the brain-case, with the basal portion of both jaws. The author described in detail the structure and relations of the various bones composing this skull, which is rendered especially remarkable by the denticulation of the alveolar margins of the jaws, to which its generic appellation refers. The denticulations, which are intrinsic parts of the bone bearing them, are of two sizes—the smaller ones about half a line in length, the larger ones from two to three lines. The latter are separated by several of the smaller denticles. All the denticles are of a triangular or compressed conical form, the larger ones resembling lanaries. Sections of the denticles show under the microscope the unmistakable characters of avian bone. The length of the skull behind the fronto-nasal suture is 2 inches 5 lines; and from the proportions of the fragment of the upper mandible preserved, the author concluded that the total length of the perfect skull could not be less than between 5 and 6 inches. The fossil seems to approach most nearly to the *Anatida*, in the near allies of which, the Goosanders and Mergansers, the beak is furnished with strong pointed denticulations. In these, however, the tooth-like processes belong to the horny bill only, and the author stated that the production of the alveolar margin into bony teeth is peculiar, so far as he knows, to *Odontopteryx*. He concluded, from the consideration of all its characters, "that *Odontopteryx* was a warm-blooded, feathered biped, with wings; and further, that it was web-footed and a fish-eater, and that in the catching of its slippery prey it was assisted by this pterosaurid armature of its jaws." In conclusion, the author indicated the characters separating *Odontopteryx* from the Cretaceous fossil skull lately described by Prof. O. C. Marsh, and which he affirms to have small, similar teeth implanted in distinct sockets.—"Contribution to the Anatomy of *Hypsilophodon Foxii*, an Account of recently acquired Remains of this Dinosaur," by J. W. Hulke, F.R.S. The author communicated details of its dentition, the form of its mandible, and that of the cones of the shoulder and fore limb, and of the haunch and hind limb, hitherto imperfectly or quite unknown. The resemblance to *Iguanodon* is greater than had been supposed, but the generic distinctness of *Hypsilophodon* holds good.—"On the Glacial Phenomena of the 'Long Island,' or Outer Hebrides," I., by James Geikie, F.R.S.E., of H.M. Geological Survey of Scotland. The author commenced by describing the physical features of Lewis, which he stated to be broken and mountainous in the south, whilst the north might be described as a great peat moss rising gradually to a height of about 400 ft., but with the rock breaking through here and there, and sometimes reaching a higher elevation. The north-east and north-west coasts are comparatively unbroken, but south of Aird Laimisheader in the west and Stornoway in the east, many inlets run far into the country. The island contains a great number of lakes of various sizes, which are most abundant in the southern mountain tract and in the undulating ground at its base. The greater part of Lewis consists of gneiss, the only other rocks met with being granite and red sandstone, and conglomerate of Cambrian age. The stratification of the gneissic rocks is generally well marked;

the prevalent strike is N.E. and S.W. with S.E. dip, generally at a high angle. The author described in considerable detail the traces of glaciation observed in the lower northern part of Lewis, and inferred from his observations that the ice passed from sea to sea across the whole breadth of this district, and that it not only did not come from the mountainous tract to the south, but must have been of sufficient thickness to keep on its course towards the north-west undisturbed by the pressure of the glacier masses which must at the same time have filled the glens and valleys of that mountain region. After describing the characters presented by the bottom-hill in the northern part of Lewis, the author proceeded to notice those of the lakes, some of which trend north-east and south-west, while those of the mountain district follow no particular direction. The lake-basins of the first series he regarded as formed at the same time and by the same agency as the *roches moutonnées* and other marks of glacial action; they are true rock-basins or hollows between parallel banks wholly of till, or of till and rock. The N.E. and S.W. lakes coincide in direction precisely with the strike of the gneiss; and the author explained their origin by the deposition of till by the land-ice in passing over the escarpments of the gneiss facing the north-west. The lakes of the mountain district are regarded by the author as all produced by glacial erosion. The author considered that the ice which passed over the northern part of Lewis could only have come from the main land. Referring to the glaciation of Raasay, he showed that the ice-sheet which effected it must have had in the Inner Sound a depth of at least 2,700 ft., and taking this as approximately the thickness of the *mer de glace*, which flowed into the Minch, which is only between 50 and 60 fathoms in depth, no part of this ice could have floated, and the mass must have passed on over the seabottom just as if it had been a land surface. Ice coming from Sutherland must have prevented the flow of the Ross-shire ice through the Minch into the North Atlantic, and forced it over the low northern part of Lewis; and the height to which Lewis has been glaciated seems to show that the great ice-sheet continued its progress until it reached the edge of the 100-fathom plateau, 40 or 52 miles beyond the Outer Hebrides, and then gave off its icebergs in the deep waters of the Atlantic.—"Notes on the Glacial Phenomena of the Hebrides," by J. F. Campbell, F.G.S. The author stated that, on the whole, he was inclined to think that the last glacial period was marine, and that heavy ice came in from the ocean, the local conditions being like those of Labrador. The author regarded most of the lake-basins of the Hebrides as formed by ice-action, and considered that the ice by which those islands were glaciated came from Greenland.—"On Fossil Corals from the Eocene Formation of the West Indies," by Prof. P. Martin Duncan, F.R.S. The specimens were collected from limestone and coral conglomerates, which are covered by, and rest upon volcanic *débris* and ejectamenta in the island of St. Bartholomew. The determination of the forms of the associated Mollusca and Echinodermata permit the following deposits being placed on a general geological horizon—the limestone and conglomerate of St. Bartholomew, the dark shales beneath the Miocene of Jamaica, the beds of San Fernando, Trinidad. These were probably contemporaneous with the Java deposits, the Eocene of the Hala chain, the great reefs of the Castel Gomberto district, the reefs of Oberberg in Steiermark, and the Oligocene of Western Europe: The affinities and identities of the fossil forms with those of contemporaneous reefs in Asia and Europe, and the limitation of the species of the existing Caribbean coral fauna, point out the correctness of the views put forth by S. P. Woodward, Carrick Moore, and the author, concerning the upheaval of the isthmus of Panama after the termination of the Miocene period.—"Note on the Lignite-deposit of Lal-Lal, Victoria, Australia," by R. Etheridge, jun., F.G.S. The lignite is almost entirely composed of remains of coniferous plants not now existing in Victoria; and the author considered that it is nearly of the same age as the lignite deposit of Morrison's Diggings, which has been regarded as Miocene.

Entomological Society, July 7.—Henry T. Stainton, vice-president, in the chair. Mr. Weir exhibited specimens of *Agrotis nemoralis*, taken near Lewes.—Mr. McLachlan exhibited a remarkable instance of hermaphroditism in a specimen of a fly (one of the *Syrphidae*) taken at Black Park.—Mr. Tovey Blackmore exhibited specimens of a gall found on oaks near Tangier, which were taken possession of for a habitation by a species of ant (*Crematogaster scutellaris*, Oliv.)—Mr. William Pryer exhibited some fine species of Lepidoptera from

China.—Sir S. S. Saunders communicated a paper "On the habits and economy of certain Hymenopterous Insects which nidificate in briars; and their parasites." The insects were exhibited at the last meeting, and Sir Sydney Saunders further exhibited a specimen of a *Raphiglossa*, which he had suffocated with cyanide of potassium, whilst asleep, showing the remarkable position of the insect during repose, as described in the paper.—Mr. Butler communicated a list of the species of *Galeodites*, with description of a new species in the British Museum.

PHILADELPHIA

American Philosophical Society, March 7.—Hector Orr made a communication on the microscopic slide of Mr. Holman.—Dr. Leiler exhibited a modification of apparatus for showing the vibration of molecules in light.—Prof. J. P. Lesley presented a map of the subterranean portions of the collieries of Wilkesbarre, Pennsylvania.—Prof. P. E. Chase read a paper on Planetaxis, the relation of the rotation of the sun and interior asteroids to the sun-spot period, and on the relative velocities of light and gravity.

March 21.—Prof. P. E. Chase pointed out the precise accordance of the wave-length of the Fraunhofer F line with the wave-length of the F note in the 26th musical octave. The other Fraunhofer lines also correspond very closely with the musical notes which are designated by corresponding letters. If this accordance indicates that the luminiferous æther is a material medium, it appears that Winnecke's estimate of the sun's distance is the most accurate of those that have been based on astronomical observations.—Prof. Persifor Fraser exhibited an apparatus for the better manipulation of the lime-light.—Mr. Holman exhibited a slide for the microscope, designed for the better observation of substances suspended in fluids, especially the different corpuscles of the blood. The slide contained two concavities on its face, which were connected by a groove, and covered by a thin plate of glass. It was highly sensitive to changes of temperature.—A resolution was adopted recommending the passage of a bill by the Legislature of Pennsylvania, inaugurating a new Geological Survey of the State.

April 4.—Prof. P. E. Chase showed that, by making the differences symmetrical at each extremity of the planetary series, the supposed failure of Bode's law in the case of Neptune was only apparent, and that it gave the rule a higher generality. He also gave two new planetary series, based, like his modification of Bode's law, on laws of oscillation. If the mean distance of Neptune be divided by successive powers of the ratio of a circumference to its diameter, the points of division will fall in alternate planetary orbits, Saturn, Asteroid, Earth, Mercury. The last term of this first series brings us to the orbital axis of the centres of gravity of the sun and Jupiter. The second series is in regular harmonic progression. Taking Jupiter's perihelion distance as the unit,

$$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \frac{1}{7}, \frac{1}{8}, \frac{1}{9}, \frac{1}{10}, \frac{1}{11}, \frac{1}{12}, \frac{1}{13}, \frac{1}{14}, \frac{1}{15}, \frac{1}{16}, \frac{1}{17}, \frac{1}{18}, \frac{1}{19}, \frac{1}{20}, \frac{1}{21}, \frac{1}{22}, \frac{1}{23}, \frac{1}{24}, \frac{1}{25}, \frac{1}{26}, \frac{1}{27}, \frac{1}{28}, \frac{1}{29}, \frac{1}{30}, \frac{1}{31}, \frac{1}{32}, \frac{1}{33}, \frac{1}{34}, \frac{1}{35}, \frac{1}{36}, \frac{1}{37}, \frac{1}{38}, \frac{1}{39}, \frac{1}{40}, \frac{1}{41}, \frac{1}{42}, \frac{1}{43}, \frac{1}{44}, \frac{1}{45}, \frac{1}{46}, \frac{1}{47}, \frac{1}{48}, \frac{1}{49}, \frac{1}{50}, \frac{1}{51}, \frac{1}{52}, \frac{1}{53}, \frac{1}{54}, \frac{1}{55}, \frac{1}{56}, \frac{1}{57}, \frac{1}{58}, \frac{1}{59}, \frac{1}{60}, \frac{1}{61}, \frac{1}{62}, \frac{1}{63}, \frac{1}{64}, \frac{1}{65}, \frac{1}{66}, \frac{1}{67}, \frac{1}{68}, \frac{1}{69}, \frac{1}{70}, \frac{1}{71}, \frac{1}{72}, \frac{1}{73}, \frac{1}{74}, \frac{1}{75}, \frac{1}{76}, \frac{1}{77}, \frac{1}{78}, \frac{1}{79}, \frac{1}{80}, \frac{1}{81}, \frac{1}{82}, \frac{1}{83}, \frac{1}{84}, \frac{1}{85}, \frac{1}{86}, \frac{1}{87}, \frac{1}{88}, \frac{1}{89}, \frac{1}{90}, \frac{1}{91}, \frac{1}{92}, \frac{1}{93}, \frac{1}{94}, \frac{1}{95}, \frac{1}{96}, \frac{1}{97}, \frac{1}{98}, \frac{1}{99}, \frac{1}{100}$$

respectively designate orbital positions of Mars, Earth, Venus, Mercury's aphelion, Mercury's mean, Mercury's perihelion. Saturn, Uranus, and Neptune are also in harmonic progression beyond Jupiter. If we express this spherulic harmony by musical intervals, they are generally such as to produce chords between any two adjacent planetary positions. But where quarter tones occur, the discordant vibrations seem to have broken up or disturbed the tendencies to planetary aggregations, thus aiding in producing the asteroidal belt, giving Mars and Mercury their diminutive masses and great eccentricity, and obliterating the theoretical planet between Mercury and Venus.—Prof. W. C. Kerr, State Geologist of North Carolina, communicated a paper on Topography of the Earth's surface, as affected by the rotation on its axis. He pointed out that the rivers of southern and eastern North Carolina flowed towards the ocean in a south-easterly direction, and that their south-western banks are elevated and bluff, while the north-eastern descend very gradually to the water. They flow through, yielding materials of the cretaceous and tertiary formations, and have apparently undergone change of location, in the course of which they have excavated their south-western banks.—Prof. Kerr exhibited some mathematical reasons why this change might have been effected by the earth's rotation.—Prof. E. D. Cope read a paper on the flat-clawed carnivora of Wyoming. This group embraced two genera, *Mesonyx* Cope, and *Synoplotherium* Cope, which bore some resemblance in dentition to *Hyacnodon*. In both the claws were broad, flat, and fissured above, and without projecting endinous insertion below, and hence little prehensile use. In

Mesonyx the astragalus has two distal facets; in *Synoplotherium* the scaphoid and lunar bones were distinct. The genera were thought to be of aquatic habit.

PARIS

Academy of Sciences, June 30.—M. de Quatrefages, president, in the chair.—During the meeting the Academy proceeded to elect a Foreign Associate in the place of the late Baron Liebig. Sir Charles Wheatstone obtained 43 votes, M. d'Omalus d'Halloy, 2; Sir C. Wheatstone was therefore declared duly elected.—The following papers were read:—Reflexions on Lagrange's memoir on the problem of three bodies, by M. J. A. Serret.—A comparison of the refraction indices of several isomeric compound ethers, by MM. Pierre and Puchot. The authors have found these indices sensibly the same when calculated for temperatures equally distant from the respective boiling points of the bodies in question.—On the analytical theory of the satellites of Jupiter, by M. Souillart.—Researches on the reflexion of solar heat at the surface of Lake Lemna, by M. L. Dufour.—On the transplantation of the marrow of bones in sub-periosteum amputations, by M. Félizet.—New observations concerning the presence of magnesium round the entire disc of the sun, by M. Tacchini.—On the want of agreement between the old theory of the thrust (*poussée*) of earth and experiment, by M. J. Curie. This was a paper dealing with fortification.—Note on magnetism, by M. J. M. Gauguin.—On the cooling and freezing of alcoholic liquids and wines, by M. Melsens.—On the decomposition of metallic carbonates by heat, by M. L. Joulin.—On the calculus of the moments of inertia of molecules, by M. G. Hinrichs.—On the production of glycerin starting from propylene, by MM. Friedel and Silva.—On a glycerin of the aromatic series, by M. E. Grimaux.—On the estimation of sugar by Barreswil's method, by M. Loiseau.—Erythrophenic acid, new reaction of phenol and aniline, by M. Jacquemin.—On crystallised mercurous iodide, by M. P. Yvon.—A summary of the state of silk culture in 1873, by M. E. Guérin-Méneville.

DIARY

FRIDAY, JULY 11.

QUEKETT CLUB, at 8.

SATURDAY, JULY 12.

BOTANIC SOCIETY, at 3.45.

TUESDAY, JULY 15.

BRITISH HOROLOGICAL INSTITUTE, at 8.30.—Anniversary.

PAMPHLETS RECEIVED

ENGLISH.—Official Guide-Book to the Brighton Aquarium; W. Saville Kent, F.Z.S.—Third Annual Report of Devon and Exeter Abert Memorial Museum Schools of Science and Art.—Quarterly Weather Report of the Meteorological Office, Part III., July to September, 1871.—Reports and Proceedings of the Miners' Association of Cornwall and Devon for 1872-3.

AUSTRALIAN.—Notes on the Climate of Victoria; Robert L. J. Ellery.—Record of Results of Observations in Meteorology, Terrestrial Magnetism, &c. taken at the Melbourne Observatory during February 1873; Robert L. J. Ellery.

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